

**Reference A**  
**REFERENCE MANUAL 83**  
**DRINKING WATER**

Contents

A.	Drinking Water Policy.....	2
B.	Water System Definitions.....	3
C.	Bacteriological Monitoring.....	3
D.	Chemical Monitoring.....	5
E.	Lead and Copper.....	9
F.	Radionuclides.....	11
G.	Water Treatment.....	12
H.	Operator Requirements.....	15
I.	Sanitary Surveys.....	15
J.	Cross Connection Control.....	15
K.	Potable Water Hauling.....	15
L.	Reports and Records Retention.....	16
M.	Contracting For Operation of Water Supply Systems .....	17
N.	Water Conservation .....	17
O.	Payment of Fees for Service.....	17
P.	Public Notification.....	17
Q.	Plan Review and Approval.....	18
R.	Potable Water for Backcountry Operations.....	18
S.	Consumer Confidence Reports.....	18
T.	Contracting for Operation of Health-Related Facilities.....	19
U.	General Definitions.....	20
Table 1 - Total Coliform Sample Requirements for Public Systems .....		22
Table 2 - Primary Inorganics .....		23
Table 3 - Secondary Contaminants & General Minerals.....		24
Table 4 - Pesticides, Herbicides & PCBs.....		25
Table 5 - Regulated Volatile and Other Organic Chemicals.....		26
Table 6 - Unregulated Volatile Organic Chemicals.....		27
Table 7 - Radionuclides.....		28
Table 8 - Sampling Plan for Total Coliform Rule, Public Water Systems.....		29
Table 9 - Computation of 90th Percentile Level.....		30
Table 10- Summary of Monitoring Requirements.....		31

## A. DRINKING WATER POLICY

NPS Park Managers will reduce the risk of waterborne diseases and provide safe drinking water to employees, the visiting public, and park partners by assuring that drinking water systems are properly operated, maintained, monitored, and deficiencies promptly corrected. Water systems will be regulated in accordance with 1) the Safe Drinking Water Act, as amended (42 U.S.C. 7401 *et seq.*), 2) the Primacy Agency (e.g. the agency designated by Federal law as having oversight responsibility) requirements, or 3) this NPS drinking water system policy, whichever is most stringent. Additional guidance is provided in RM-83, Reference A.

- A.1 All parks that operate public or non-public drinking water systems will have at least one state certified operator and a designated backup operator responsible for the operation of the systems in that particular park.
- A.2 All designated operators, including backup operators, will be trained in accordance with the requirements of the Primacy Agency. NPS Park Managers will assure that operators receive required training and submit a list annually of operators requiring training to the Public Health Service (PHS) Consultant.
- A.3 NPS Park Managers will designate, in writing, personnel who will assure that required records are reviewed, maintained in permanent files for periodic review by the PHS Consultant or Primacy Agency representatives, and that reports are submitted on a timely basis as required by the PHS Consultant and the Primacy Agency.
- A.4 Bacteriological and chemical sampling will be performed in accordance with Federal, State and local laws and regulations, and with the requirements in RM-83, whichever is most stringent.
- A.5 All water samples will be tested in laboratories certified by the Primacy Agency.
- A.6 All surface water sources and any groundwater sources subject to surface water influence, as determined by 1) the Primacy Agency for public systems, or 2) the PHS Consultant for nonpublic systems, will be provided with approved filtration.
- A.7 All drinking water systems will be continuously disinfected. The PHS Consultant, however, may specifically exempt non-public systems, in writing. Acceptable disinfecting methods are those which provide a measurable disinfectant residual in the distribution system.
- A.8 One disinfectant residual sample per day will be measured and recorded from representative points in all park-operated, disinfected, distribution systems. Parks operating nonpublic drinking water systems or receiving water from municipalities should contact the PHS Consultant for residual monitoring requirements.
- A.9 Sanitary surveys will be conducted in accordance with Primacy Agency requirements.

- A.10 All drinking water systems will have a documented cross connection control program on file for review by the Primacy Agency and the PHS Consultant.
- A.11 All NPS water hauling operations, whether conducted by the park or a private contractor, will be hauled from an approved water source that meets the requirements of the Safe Drinking Water Act or RM-83, Reference A, whichever is most stringent.
- A.12 All parks will comply with the public notification requirements of the Safe Drinking Water Act.
- A.13 When drinking water system modifications or new construction are proposed, parks will contact the Primacy Agency to determine if plans and specifications should be submitted for approval. A copy of the plans and specifications will be provided to the PHS Consultant.
- A.14 Potable water for backcountry operations must be 1) hauled from a public system, or 2) boiled, or 3) filtered and disinfected.

## **B. WATER SYSTEM DEFINITIONS**

- B.1 **Public Water System (PWS):** A system for the provision to the public of piped water for human consumption, providing such system has at least 15 service connections or serves an average of at least 25 individuals at least 60 days a year.
- B.2 **Public Community Water System (PC):** A system that serves at least 15 service connections used by year-round residents or that regularly serves at least 25 year-round residents.
- B.3 **Public Non-Transient Non-Community Water System (PNT):** A system that regularly serves at least 25 of the same persons for more than 6 months per year. Examples: Systems serving facilities such as schools or non-residential work sites where the same people use the water on a regular basis.
- B.4 **Public Non-Community Transient Water System (PNC):** Any system not described in 1 or 2 above that serves more than 25 persons per day at least sixty days out of the year. Examples: Systems serving campgrounds or other non-residential areas not used by at least 25 of the same people for more than 6 months a year.
- B.5 **Non-Public Water Systems (NP):** A system that serves less than 15 service connections, or an average of less than 25 people per day. Examples could include systems serving ranger stations, individual residences and small campgrounds.

## **C. BACTERIOLOGICAL MONITORING**

Definitions of the systems described below, as well as definitions of other terms used in this

guideline are listed above and on pages 20 and 21 of this chapter.

C.1 Number and Frequency of Samples:

a. Public-community systems: Two samples per month minimum, or as per Table 1. Samples must be taken weekly or at equally spaced intervals with a minimum of two times per month.

b. Public-non-community systems: Two samples per month, minimum, or as per Table 1. Samples must be taken at equally spaced intervals two times per month.

c. Non-public systems: One sample per month. The sampling frequency may be changed if authorized in writing by the PHS Consultant.

C.2 Special Sampling Requirements:

a. Seasonal systems: Seasonal systems must be sampled prior to opening of the system. Two consecutive samples (may be collected on the same day, but not at the same time and collected at different locations if possible) must be negative before the system is put in use.

b. Source water monitoring: Some Primacy Agencies require periodic source monitoring. Sampling of source water must be in accordance with Primacy Agency requirements.

c. Municipal supplies: National Park Service distribution systems serviced by municipal systems should be included in municipal sampling programs whenever feasible. When Park systems are not sampled by the municipality, the PHS Consultant should be contacted to determine which systems require sampling by NPS.

C.3 Sample siting plan: Each system must have a written sample siting plan available for review by the Primacy Agency, and PHS Consultant. All samples must be collected from identified sampling sites. PHS Consultants can assist in preparing these plans.

C.4 Positive samples: Positive total coliform samples, using the presence/absence criteria, require that the laboratory perform testing of the positive sample for fecal coliform or *E.coli*. The Park should notify the PHS Consultant, and collect repeat samples in accordance with Table 8 and the following:

a. Public systems: Three repeat samples must be collected within 24 hours of notification of the positive result. One sample must be collected at the site of the positive sample, and one upstream and one downstream, each within 5 service connections of positive sample site. In addition, a minimum of five samples must be collected the following month. **NOTE:** This includes public non-community systems.

b. Non-public systems: Two repeat samples must be collected and analyzed.

C.5 Non-compliance - Public Systems: **If any repeat samples are positive** the park must notify the Primacy Agency and PHS Consultant by close of business of the day following receipt of notification of sample results. The laboratory will perform additional testing for fecal coliform or *E.coli*. If the results of the repeat tests are positive for fecal coliform or *E.coli*, this constitutes an acute violation and requires immediate action to notify water consumers and to correct the situation. The Park must contact the Primacy Agency for their concurrence on the content and method to be used in notifying the public. Both the PHS Consultant and Primacy Agency must be contacted for assistance in determining and implementing a course of action to correct the situation.

In instances where there is an imminent or substantial threat to the health of the staff or visitors the PHS Consultant must notify the Director, Public Health Program (PHP), WASO, and make periodic status reports. The Director, PHP, is responsible for dissemination of information to appropriate NPS-WASO personnel. Public notification is required if the required number of samples is not collected, or if more than one routine sample per month is positive for total coliform. Again, coordination with the Primacy Agency is required.

C.6 Non-compliance - Non-Public Systems: The procedure described for public systems must be followed except that notification and involvement of the Primacy Agency is not required.

C.7 Laboratories: All water samples must be tested in laboratories certified by the Primacy Agency.

#### **D. CHEMICAL MONITORING**

The monitoring requirements in this section may be changed if authorized in writing by the PHS Consultant. Systems connected to municipal supplies are not required to sample if current analyses are available from the municipality. If current analyses are not available, the Park may be requested by the PHS consultant to perform the analyses.

D.1 Primary, secondary, and general mineral (Tables 2 & 3): Included in this section are the primary inorganic, secondary and general mineral analyses which must be conducted to meet regulatory requirements or to determine the most feasible treatment methodologies to provide water of satisfactory quality. Samples shall be collected from the source before treatment. The primary, secondary and general mineral parameters are listed in Tables 2 and 3. Sampling requirements are as shown below:

a. Public Community and Non-Transient Non-Community Systems

<u>Source</u>	<u>Analysis</u>	<u>Frequency</u>
Ground	Primary S & GM* Nitrate	Every three years Every three years Every year
Surface	Primary S & GM* Nitrate	Every year Every year Every year

b. Public Non-community Transient Systems

<u>Source</u>	<u>Analysis</u>	<u>Frequency</u>
Ground	Primary S & GM* Nitrate	Every nine years Every nine years Every year
Surface	Primary S & GM* Nitrate	Every nine years Every nine years Every year

c. Non-public Systems

<u>Source</u>	<u>Analysis</u>	<u>Frequency</u>
Ground	Primary S & GM* Nitrate	Every nine years Every nine years Every year
Surface	Primary S & GM* Nitrate	Every nine years Every nine years Every year

\* S & GM = Secondary and General Mineral

## D.2 Organics:

- a. Pesticides, Herbicides & PCB's (Table 4): The pesticides and herbicides which must be analyzed and their **Maximum Contaminant Levels (MCLs)** are listed in Table 4. All public community and public non-transient non-community systems must be sampled annually unless a State waiver has been issued. All public non-community (transient users only) and non-public systems must be sampled one time. Additional sampling required is dependent upon the initial sampling results and source vulnerability. Samples should be collected from the source after treatment and prior to entry to the distribution system.
  
- b. Volatile Organic Chemicals (VOC) (Table 5 & 6): There are twenty-two VOC's that have MCL's (regulated), and thirty-five VOC's that do not have MCL's (unregulated) but must be analyzed. Samples should be collected after treatment and prior to entry to the distribution system. The lists of the regulated and unregulated volatile organics and other regulated organic chemicals are shown in Tables 5 and 6. Tests for VOC's should be conducted according to the following schedules:
  - i. Groundwater Supplies. Public community and public non-transient non-community systems served by groundwater supplies should have collected a sample from each entry point to the distribution system for an initial analysis by December 1990. Additional sampling required is dependent upon the initial sampling results and source vulnerability. A single routine sample must be collected at three-year intervals thereafter, unless a State waiver has been issued.
  
  - ii. Surface Water Systems. The initial sampling for public community and public non-transient non-community systems served by surface sources consists of four quarterly samples to be collected over a one-year period. The first sample should have been collected by December 1990. Sampling must be repeated at three-year intervals thereafter, unless a State waiver has been issued.
  
  - iii. All Other Public Systems (ground or surface water). These systems should be sampled one time for baseline information. Contact the Regional PHS Consultant for additional information
  
  - iv. Non-public Systems. These systems should be sampled in special situations only. Contact the Regional PHS Consultant for additional information.

Note: If the primacy agency grants a variance from organics testing, the Regional PHS Consultant may also grant a variance under NPS-83.

D.3. Disinfectants/Disinfection Byproducts:

- a. On December 16, 1998 EPA finalized the Stage 1 Disinfectants/Disinfection Byproducts Rule (D/DBP), which became effective February 16, 1999. The purpose of this rule is intended to balance the use of disinfectants with the potential health effects from long term exposure to byproducts formed by the reaction of disinfectants with natural organic and inorganic matter in drinking water. EPA expects to issue a Stage 2 Disinfection Byproducts Rule by November 2000.
- b. This rule applies to all community and non-transient non-community water systems that add a chemical disinfectant to the water in any part of the treatment process. This includes surface water systems, groundwater systems under direct influence of surface water, and groundwater systems.
- c. **Compliance dates:**
  - i. Large Surface Water Systems. For those systems serving 10,000 or more people each day, the effective date is December 16, 2001.
  - ii. Small Surface Water Systems. For those systems serving less than 10,000 people each day, the effective date is December 16, 2001.
  - iii. Groundwater Systems Under Direct Surface Water Influence. The effective date for all systems is December 16, 2001.
  - iv. Groundwater Systems. The effective date for all systems is December 16, 2003.
- d. **Byproducts to be monitored:**
  - i. Total trihalomethanes (TTHM) includes the sum of chloroform, bromoform, bromodichloromethane, and dibromochloromethane.
  - ii. Haloacetic acids (HAA5) include the sum of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.
  - iii. Bromate - only for those systems using ozone for disinfection.
  - iv. Chlorite - only for those systems using chlorine dioxide for disinfection.
- e. **Disinfectants to be monitored:**

- i. Chlorine - for those systems using chlorine.
  - ii. Chloramine - for those systems using chloramine.
  - iii. Chlorine dioxide - for those systems using chlorine dioxide.
- f. **Maximum contaminant levels (MCL):**
- i. Total trihalomethanes (TTHM) = 0.08 mg/l
  - ii. Haloacetic acids (HAA5) = 0.06 mg/l
  - iii. Chlorite = 1.0 mg/l
  - iv. Bromate = 0.010 mg/l
  - v. Chlorine = 4.0 mg/l
  - vi. Chloramine = 4.0 mg/l
  - vii. Chlorine dioxide = 0.8 mg/l
- g. **Monitoring requirements:**
- i. Large surface water systems monitor 4 samples/plant/quarter for TTHMs and HAA5s.
  - ii. Small surface water systems monitor 1 sample/plant/year for TTHMs and HAA5s.
  - iii. Very small surface water systems serving less than 500 people each day monitor 1 sample/plant/year for TTHMs and HAA5s.
  - iv. Large ground water systems serving more than 10,000 people each day monitor 1 sample/plant/quarter for TTHMs and HAA5s.
  - v. Small ground water systems serving less than 10,000 people each day monitor 1 sample/plant/year for TTHMs and HAA5s.

## **E. LEAD AND COPPER**

On June 7, 1991, final national primary drinking water regulations for lead and copper were adopted for public-community and public non-transient non-community water systems. The rule establishes maximum contaminant level goals (MCLG), and action levels for both lead and copper. It also sets forth treatment technique requirements and specifies monitoring

requirements, analytical methods, public notification requirements, record keeping and reporting requirements, and compliance schedules. An EPA public education program is also required if an action level is exceeded.

The MCLG for lead is zero and the action level is 0.015 mg/l measured in the 90th percentile at the consumer's tap. The MCLG for copper is 1.3 mg/l and the action level is also 1.3 mg/l measured in the 90th percentile at the consumer's tap. In order to compute the 90th percentile please refer to Table 9.

In order to assess and reduce the potential for problems associated with lead and copper, and comply with the new rule, parks should conduct:

E.1 Initial Surveillance for All NPS Water Systems:

- a. Have the water entering each system analyzed for lead and copper at a certified laboratory with a MDL of 0.001 mg/l for lead and 0.020 mg/l for copper. This will normally be done as part of the inorganic analysis.

If source water exceeds 0.015 mg/l of lead or 1.3 mg/l of copper, the levels must be reduced below those levels before the water enters the system. Systems with lead or copper contamination problems will have 24 months to install treatment specified by the Primacy Agency and 12 months after treatment installation to correct follow-up source samples.

After treatment, source water monitoring will be standardized to a three-year cycle established by the Primacy Agency.

- b. Take first draw tap samples (one liter) at each Park Service owned residence and have them analyzed for lead and copper.
- c. If one or more first draw tap samples are elevated for lead or copper (>0.015 mg/l, >1.3 mg/l), please contact your Regional PHS Consultant for further recommendations.
- d. Assure that lead solder or flux is no longer used in domestic water plumbing.
- e. Replace drinking fountains listed by EPA under the Lead Contamination Control Act.

E.2 Monitoring:

- a. Monitor community and non-transient non-community systems for lead and copper by collecting one set of samples every 6 months by July 1993.
- b. If the samples are not above the action levels in the 90th percentile, samples must

be collected once a year for three years and then once every three years as long as the results are below the action level.

- c. If the action level is exceeded in the 90th percentile at the consumer's tap, treatment methods approved by the Primary Agency must be installed.

The number of samples in each set should be determined using the following table:

<b>System (Pop)</b>	<b>Number of Sampling Sites (Base Monitoring)</b>	<b>No. of Sampling Sites* (Reduced Monitoring)</b>
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
≤100	5	5

\* The Primacy Agency may allow Reduced monitoring if certain conditions are met. Otherwise, base monitoring is required.

Systems are not required to conduct sampling (unless required by the State) during State review of treatment, corrosion control evaluations, or installation of corrosion control or source water treatment.

#### **F. RADIONUCLIDES (TABLE 7)**

- F.1 Current EPA regulations require a screening test for gross alpha particles. If the gross alpha exceeds 5 picocuries per liter, test for radium-226. If radium-226 exceeds 3 picocuries per liter test for radium-228 and uranium. All public community systems should have been tested previously by analyzing four quarterly samples (either separate or composite) collected over the course of a year. If results of the initial round of sampling are not available, the PHS Consultant must be contacted. After the initial round of testing, public community and non-transient non-community systems must be resampled every four years.
- F.2 Gross Beta testing is only required for community systems using surface water sources and serving more than 100,000 persons.
- F.3 Under special situations, public non-community transient systems should be sampled for gross alpha. If the gross alpha exceeds 5 picocuries per liter or if the system is located in a geographic area where high levels may be anticipated, analysis for radium-226, radium-228 and uranium also should be included.

- F.4 Non-public systems should be sampled and one analysis done for gross alpha if the source is located in areas where high levels of natural radionuclides are known or suspected.
- F.5 Radionuclide samples should be collected from the source before treatment.
- F.6 EPA proposes adding uranium and radon testing for community and non-transient non-community water systems in a PHASE III rule to be issued by 2000.

**G. WATER TREATMENT**

G.1 Filtration:

- a. All surface water sources and any groundwater sources subject to surface water influence must be provided with approved filtration.
- b. The compliance schedule for provision of filtration depends upon the source and the type of system. For surface water supplies, filtration must be in place and operational by June 29, 1993. For groundwater supplies that are determined to be under the influence of surface water, filtration must be in place and operational 18 months after the Primacy Agency officially issues the determination. Primacy Agencies must officially classify community systems by June 29, 1994. Non-community systems must be classified by June 29, 1999. However, determinations may be made at any time before either deadline. Thus, parks may know that a groundwater source requires filtration in advance of the June 29, 1994 and 1999 deadlines.
- c. Parks with groundwater sources clearly under the influence of surface water should contact their Regional PHS Consultant for assistance in developing a schedule to provide filtration or developing a new groundwater source.
- d. In those cases where it is not certain if a groundwater source is under the influence of surface water, parks should be aware that the criteria for making such determinations have not been developed by all Primacy Agencies. When these criteria are developed, parks should contact their Regional PHS Consultant for assistance in developing and initiating a schedule such as the following to address the issue:

Evaluate Systems Sources	By 6/94 for PC By 6/99 for PNC
Request Funding	Immediately after notification
Conduct Engineering study to determine specific filtration methodology or develop a new groundwater source	By 12/94 for PC By 12/99 for PNC or within 6 months after notification
Construct facilities and place in operation	By 12/95 for PC By 12/00 for PNC or within

18 months after notification

- e. On December 16, 1998 EPA finalized an Interim Enhanced Surface Water Treatment Rule (IESWT), which becomes effective February 16, 1999. This rule is intended to improve control of microbial pathogens, including specifically the protozoan *Cryptosporidium*, by enhancing physical removal efficiencies in drinking water, and addresses risk trade-offs with disinfection byproducts. EPA expects to issue a Long Term Enhanced Surface Water Treatment Rule in November 2000.
- f. This rule applies to public water systems that use surface water or ground water under the direct influence of surface water and serve 10,000 or more people each day. The date for these systems to be in compliance with this rule is December 2001.
- g. The major provisions of this rule include:
  - 2-log *Cryptosporidium* removal requirement for systems that filter.
  - Strengthened combined filter effluent turbidity performance standards.
  - Individual filter turbidity monitoring provisions.
  - Systems using ground water under the direct influence of surface water are subject to the new *Cryptosporidium* rules.
  - Requirement for covers on new finished water reservoirs.
  - Sanitary surveys, conducted by States, for all surface water systems regardless of size.

G.2 Turbidity Monitoring:

- a. All water requiring filtration under the Surface Water Treatment Rule (See paragraph G.1. above) must be analyzed for turbidity. The unit of measure for turbidity is the Nephelometric Turbidity Unit (NTU). The MCL is 1.0 NTU for diatomaceous earth and slow sand filtration and 0.5 NTU for conventional and direct filtration. The MCL for "other technology" filtration such as bag filtration is 1.0 NTU unless a more stringent requirement is established by the Primacy Agency. The turbidity must never be greater than 5.0 NTU. Systems serving 500 or fewer persons per day must collect one grab sample per day. Starting June 29, 1993, systems serving more than 500 persons per day must collect one grab sample every four hours when water is served to the Public or continuous monitoring may be substituted for grab sampling.

- b. Samples must be collected after each treatment unit (filtered water) and prior to distribution. If required by the Primacy Agency, a record of all samples including the number of measurements per month, percent of measurements in compliance and the date and value for all measurements greater than 5 NTU must be reported to the Primacy Agency on a monthly basis, within 10 days following the end of the month. A party approved by the Primacy Agency must take measurements.

Public notification is required if an inadequate number of samples are collected, or if there is non-compliance with the MCL. The PHS Consultant must be informed of any violation. The issuance and content of public notification must be determined in consultation with the Primacy Agency and the PHS Consultant.

### G.3 Disinfection:

All water systems must be continuously disinfected unless specifically exempted in writing by the PHS Consultant. Such exemptions must be determined on a case-by-case basis and only for non-public systems utilizing ground water sources. Acceptable disinfection methods are those which provide a measurable disinfectant residual in the distribution system.

- a. Distribution System Residual: A minimum free chlorine residual of 0.2 mg/l must be maintained at all points throughout the distribution system. If disinfectants other than chlorine are used, the PHS Consultant or Primacy Agency must be contacted for residuals to be maintained. The absence of a residual indicates either an equipment failure or the presence of contamination in the system. If an equipment failure is not the cause, the park must contact the PHS Consultant or the Primacy Agency for assistance in determining what action to take.
- b. Routine Monitoring: All chlorinated distribution systems must be monitored for the presence of a chlorine residual. A minimum of one sample per day must be measured and recorded from representative points in the distribution system. Parks receiving water from municipalities should contact the PHS Consultant for residual monitoring requirements.

In addition to monitoring the distribution system itself, parks with surface water systems must monitor the entry point to the distribution system for the presence of a chlorine residual. The minimum chlorine residual is 0.2 mg/l or a higher level determined using CT calculations. If the residual drops below 0.2 mg/l (or the CT-Value, which ever is greater), it must be restored within four hours. Whenever the residual falls below the required value, the park must notify the Primacy Agency and the PHS Consultant as soon as possible but not later than the end of the next business day. For systems serving more than 3300 persons, the chlorine residual must be monitored on a continuous basis. Systems serving fewer than 3301 persons can take grab samples in lieu of continuous monitoring at the following frequencies:

<u>System Population</u>	<u>Samples/day</u>
< 500	1
501-1000	2
1001-2500	3
2501-3300	4

- b. Redundancy of Disinfection Equipment: For surface water systems, replacement of disinfection equipment must be available and in service within four hours of problem identification.
- c. Special Monitoring-Bacteriological Sampling Sites: The chlorine residual must be measured at the bacteriological sample site each time a bacteriological sample is collected. The results should be recorded on the sample form.

## **H. OPERATOR REQUIREMENTS**

- H.1 All parks that operate public or non-public drinking water systems will have at least one state certified operator and a designated backup operator responsible for the operation of the systems in that particular park.
- H.2 The park must designate in writing, backup operators who have adequate training and skills to properly operate the system when the primary operator is not available. Certification is recommended and is required by some Primacy Agencies.
- H.3 Parks having only non-public systems must have a certified operator.

## **I. SANITARY SURVEYS**

The 1986 amendments to the Safe Drinking Water Act require that the Primacy Agency conducts sanitary surveys or an entity approved by the Primacy Agency.

## **J. CROSS CONNECTION CONTROL**

Each park must have a documented cross connection control program on file for review by the Primacy Agency and the Regional PHS Consultant.

## **K. POTABLE WATER HAULING**

In the absence of State or local standards, the following standards shall apply to NPS water hauling operations whether conducted by the Park or a private contractor:

- K.1 Water shall be hauled from an approved source that meets the requirements of the Safe Drinking Water Act (SDWA).
- K.2 Containers must be, (1) constructed of non-toxic materials, (2) be non-porous, (3) have never been used for storing anything but potable water, (4) used only for hauling potable water, and (5) labeled "potable water only".
- K.3 Before the container is filled, sufficient chlorine shall be added to achieve a free chlorine residual of 1.0 ppm, in the water hauled. A free chlorine residual shall be taken, and recorded.
- K.4 The container must be flushed each time water is hauled if it has not been used for more than one day.
- K.5 At no time during the water filling operation shall there be potential for backflow.
- K.6 Hoses used to fill and empty tanks shall be properly identified, and used only for potable water. The ends of the hoses should be capped, when not in use, and the caps should be attached to the hoses.
- K.7 Hoses shall be stored in such a manner that they are not subject to contamination from surface run-off, birds, rodents, and so on.
- K.8 All valves and fire hydrants shall be flushed before the connection of any hoses.
- K.9 No bacteriological testing will be required on water hauling tanks when source water systems and receiving water systems are monitored.

**L. REPORTS AND RECORDS RETENTION**

The park has the responsibility for the maintenance of official records and to have them available in an organized manner for the review and inspection of various regulatory entities and for periodic review by the PHS Consultant. Records must be retained as follows or as required by the Primacy Agency:

<u>RECORDS</u>	<u>RETENTION PERIOD</u>
Chemical Analyses.....	Indefinitely
Bacteriological Analyses.....	Five years
Turbidity Measurements.....	Five years
Public Notices, Administrative Orders, Variances and Exemptions.	Five years
Sanitary Surveys.....	Ten years
Operating Records--includes water usage, water production, chemical usage, chlorine residuals, etc.....	Five years
System History - includes well logs test pump data, system modifications, as-builts, operator designations, significant events...	Indefinitely

Lead and Copper Rule Records..... Twelve years

**M. CONTRACTING FOR OPERATION OF WATER SUPPLY SYSTEMS**

Parks should strive to maintain a professionally qualified staff to manage and operate NPS-owned water supply systems. Contracting for health-related operations programs is not recommended. This is noted in a memorandum from the Acting Director, National Park Service, and dated April 30, 1986. A copy of the memorandum is included at the end of this chapter.

**N. WATER CONSERVATION**

NPS Management Policies (Chapter 9.1.5.1) requires that the NPS design, construct, manage, and maintain water supply systems in a fashion which promotes conservation. Conservation measures which should be considered include: metering, leak detection and correction, automatic irrigation systems, low-use water fixtures, low flush toilets, and programs which discourage wasteful use of water.

**O. PAYMENT OF FEES FOR SERVICE**

Many Primacy Agencies charge fees for services. Fees are charged for plan review, construction and operating permits, and for sanitary surveys conducted by the Primacy Agency. The Safe Drinking Water Act placed federally owned and operated systems under the jurisdiction of Primacy Agencies. Parks may be required to pay subject fees. Payment of fees should be included in annual budget and contracting plans, as appropriate.

**P. PUBLIC NOTIFICATION**

The public notification requirements of the Safe Drinking Water Act require water systems to notify the persons they serve when:

- P.1 Violation(s) of a National Primary Drinking Water Regulation or its monitoring requirements occur.
- P.2 Variances or exemptions are in effect.
- P.3 Systems do not comply with any schedule associated with a variance or exemption

The public notification requirements distinguish between serious violations, such as failure to meet a maximum contaminant level (MCL), and minor violations such as failure to use the proper analytical technique. This is accomplished by a two-tiered structure of public notification requirements. Tier I violations pose acute risk to human health and require rapid notification. Tier II violations do not pose an acute risk and more time is allowed for notification.

The Primacy Agent is responsible for approving the content distribution and timing of

public notices. Therefore, whenever public notification is required, parks must contact the Primacy Agency for assistance in preparing such notices.

#### **Q. PLAN REVIEW AND APPROVAL**

Whenever major water system modifications are proposed, parks must contact the Primacy Agency to determine whether or not plans and specifications must be submitted for approval.

#### **R. POTABLE WATER FOR BACKCOUNTRY OPERATIONS**

Water used for drinking and culinary purposes must be obtained from an approved public system or from a source known to be free of chemical contamination and treated by:

- a. Bringing to a rolling boil for 1 minute (Add an additional minute for each 1,000 feet above sea level) **or**
- b. Filtering through an "Absolute" 1 micron filter, or one labeled as meeting American National Standards Institute (ANSI/NSF) (formerly the National Sanitation Foundation) International Standard #53 for "Cyst Removal" followed by disinfection. Add 8 drops of liquid chlorine bleach per gallon of water or another approved sanitizer and let stand for 30 minutes.
- c. Taking a supply of water from home or from other treated domestic sources for short trips. Due to the lack of labeling and manufacturing standards, there is no assurance that bottled water is safer than public drinking water and may require boiling also.

Water storage containers must be free of contamination when in use and must be washed and sanitized as needed.

#### **S. CONSUMER CONFIDENCE REPORTS**

The Safe Drinking Water Amendments of 1996 require that Public Community Systems provide all consumers with a yearly Consumer Confidence Report which outlines all bacteriological, physical, and chemical monitoring results and Maximum Contaminant Levels for the preceding year.

CONTRACTING FOR OPERATION OF  
HEALTH-RELATED FACILITIES



United States Department of the Interior

NATIONAL PARK SERVICE  
P.O. BOX 37127  
WASHINGTON, D.C. 20013-7127

IN REPLY REFER TO:

Memorandum

APR 30 1986

To: Field Directorate

From: <sup>ACTING</sup> Director

Subject: Contractual Services for Health-Related Operations Programs

Your  
National Park Service  
Reminds You...



"TAKE PRIDE IN AMERICA"

As you know, it has been a long-standing policy of the National Park Service to strive for a high degree of achievement backed by professional competence in matters concerning the health and safety of visitors. That protection must include the production and delivery of safe drinking water as well as the most effective treatment of biological waste products that we can provide.

The National Park Service leads the Federal recreation establishment in its water quality program. To achieve this we have made a substantial investment in personnel, fiscal, and physical resources over the years. We must maintain close control over these programs in order to maintain their effectiveness. Despite the budgetary constraints today, it is vital that dedicated Park Service personnel continue to monitor and operate our park systems in the excellent manner that the public has come to expect of us.

I am confident that each of you will find the means within your operating program to deal with personnel and fiscal shortages without resorting to contract services to operate these critical health and safety programs.

Denis P. Galvin

## U. GENERAL DEFINITIONS

CT-value (Concentration X Time value): The product of "residual disinfection concentration" in mg/l determined before or at the first customer, and the corresponding "disinfection contact time" in minutes.

Cryptosporidium: Coccidian protozoan shed in the feces of man and animals in the form of oocysts, which can survive under adverse environmental conditions for long periods of time. Responsible for a severe gastrointestinal disease called cryptosporidiosis.

*Escherichia coli* (*E.coli*): One of the species of bacteria in the fecal coliform group. It is found in large numbers in the gastrointestinal tract and feces of warm-blooded animals and man. Its presence is considered indicative of fresh fecal contamination, and it is used as an indicator organism for the presence of less easily detected pathogenic bacteria.

Fecal Coliforms: Aerobic and facultative, gram-negative, non-spore-forming rod-shaped bacteria capable of growth at 44.5 degrees C., and associated with fecal matter of warm-blooded animals.

*Giardia lamblia*: Flagellate protozoan shed in the feces of man and animals, usually in the cyst stage, and responsible for a severe gastrointestinal disease called giardiasis.

Ground water under the direct influence of surface water: Water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*; or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

Heterotrophic Plate Count (HPC): Number of colonies of heterotrophic bacteria grown on selected solid media at a given temperature and incubation period, usually expressed in number of colony forming units per milliliter of sample (CFU/ml).

Heterotrophic microorganisms: Bacteria and other microorganisms that utilize organic matter synthesized by other organisms for energy and growth.

Inorganic Chemicals (IOCs): Chemical substances of mineral origin not having carbon in their molecular structure.

Maximum Contaminant Levels (MCLs): The highest permissible concentration of a substance allowed in drinking water, as established by EPA.

Maximum Contaminant Level Goals (MCLG): The highest permissible concentration of a substance allowed in drinking water at which no known or anticipated health effects will occur. They are health goals and are not enforceable.

**Minimum Detection Limit (MDL):** The lowest achievable concentration of a contaminant that can be measured under ideal laboratory conditions. A more technical definition is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the concentration of the substance being measured is greater than zero.

**Potable Water Hauling:** The transportation of potable water as a primary, a supplemental, or an emergency source in containers greater than 50 gallons.

**Primacy Agency:** Generally a State agency authorized by the EPA to administer provisions of Safe Drinking Water Act. (Note: Not all States have requested this authorization. If authorization is not requested, EPA is the Primacy Agency).

**Radionuclide:** A material with an unstable atomic nucleus, which spontaneously decays or disintegrates, producing radiation.

**Sanitary Survey:** A detailed investigation of the features of a water system and conditions, which may impact the ability of the system to deliver safe drinking water.

**Synthetic Organic Chemicals (SOCs):** Man-made organic chemicals, many of which have been detected in drinking water. This group includes the VOCs.

**Trihalomethanes (THMs):** A group of volatile organic compounds formed when chlorine reacts with naturally occurring humic substances. Individual Compounds are not regulated under THM's.

**Total Coliforms:** A group of bacteria predominantly inhabiting the intestines of man or animals but occasionally found elsewhere. Presence in water is used as indication of possible pathogen contamination.

**Total Trihalomethanes (TTHMs):** A term used to designate the total concentration of chloroform, bromoform, dibromochloromethane, and bromodichloromethane in the National Primary Drinking Water Regulations. Combination of THM compounds is regulated.

**Volatile Organic Compounds (VOCs):** Lightweight man-made organic compounds that vaporize, or evaporate, easily.

**TABLE 1**

**NATIONAL PARK SERVICE**

**TOTAL COLIFORM SAMPLE REQUIREMENTS FOR PUBLIC SYSTEMS**

Population Served Per Day	Minimum Number of Samples Per Month
25 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100

The population served (p) is defined as the sum of the residents (r) and the average daily transient population (total number of transients (t) served per month divided by the number of days (d) of the month during which the transients were served), i.e.,  $p = r + t/d$ . (If the transient population changes significantly from month to month, utilize information from previous years of operation to calculate the average daily transient population for the current month.)

**TABLE 2**

**PRIMARY INORGANIC ANALYSIS**

<b>Contaminant</b>	<b>MCL</b>	<b>Units</b>
Antimony	0.006	mg/l
Arsenic	0.05	mg/l
Asbestos	7.0	million fibers/l (longer than 10 microns)
Barium	2.0	mg/l
Beryllium	0.004	mg/l
Cadmium	0.005	mg/l
Chromium	0.1	mg/l
Cyanide	0.2	mg/l
Fluoride	4.0	mg/l
Lead	<0.015	mg/l
Mercury	0.002	mg/l
Nickel	0.1	mg/l
Nitrate (as N)	10.0	mg/l
Nitrite (as N)	1.0	mg/l
Total Nitrate and Nitrite (as N)	10.0	mg/l
Selenium	0.05	mg/l
Thallium	0.002	mg/l

Action Level Inorganics: House Tap Testing

Lead	0.015	mg/l-90th percentile
Copper	1.3	mg/l-90th percentile

Special Test Inorganics

Sodium	<200 mg/l	<b>No limit established.</b> 200 mg/l or less is preferred. 20 mg/l is considered the level for concern for people with the need to control salt intake.
--------	-----------	---

**TABLE 3****SECONDARY CONTAMINANTS  
AND  
GENERAL MINERAL ANALYSIS**

<b>Contaminant</b>	<b>Goal</b>	<b>Units</b>
<u>Secondary Inorganics</u>		
Aluminum	0.05 - 0.2	mg/l
Chloride	250.0	mg/l
Color	15.0	Color Units
Copper	1.3	mg/l
Corrosivity	Noncorrosive	
Fluoride	2.0	mg/l
Foaming agents	0.5	mg/l
Iron	0.3	mg/l
Manganese	0.05	mg/l
Odor	3.0	TON
pH	6.5-8.5	
Silver	0.1	mg/l
Sulfate	250.0	mg/l
Total dissolved solids	500.0	mg/l
Zinc	5.0	mg/l
<u>General Minerals*</u>		
Alkalinity	30-500	mg/l
Calcium	75-200	mg/l
Hardness	<200	mg/l
Hydrogen Sulfide	Test at source only when necessary	
Magnesium	50-150	mg/l
Phosphate	<0.2	mg/l
Potassium	for corrosion control	
Specific Conductance	for corrosion control	
Temperature (At Source)	for corrosion control	

\* Values listed are for information only. No limits are established.

**TABLE 4****PESTICIDE, HERBICIDE & PCB ANALYSIS**

<b>Contaminant</b>	<b>MCL</b>	<b>Units</b>
2,4-5-TP (Silvex)	0.05	mg/l
2,4-D (Formula 40)	0.07	mg/l
Alachlor (Lasso)	0.002	mg/l
Aldicarb	0.003	mg/l
Aldicarb sulfoxide	0.004	mg/l
Aldicarb sulfone	0.002	mg/l
Atrazine (Atranex, Crisazina)	0.003	mg/l
Carbofuran (Furadan 4F)	0.04	mg/l
Chlordane	0.002	mg/l
Dalapon	0.2	mg/l
Dibromochloropropane (DBCP)	0.0002	mg/l
Dinoseb	0.007	mg/l
Diquat	0.02	mg/l
Endothall	0.1	mg/l
Endrin	0.002	mg/l
Ethylene dibromide (EDB)	0.00005	mg/l
Glyphosate	0.7	mg/l
Heptachlor epoxide	0.0002	mg/l
Heptachlor (H-34, Heptox)	0.0004	mg/l
Lindane	0.0002	mg/l
Methoxychlor (DMDT, Marlate)	0.04	mg/l
Oxamyl (Vydate)	0.2	mg/l
PCBs (as decachlorobiphenyl)	0.0005	mg/l
Picloram	0.5	mg/l
Pentachlorophenol	0.001	mg/l
Simazine	0.004	mg/l
Toxaphene	0.003	mg/l
Benzo [a] pyrene	0.0002	mg/l
Di (2-ethylhexyl) adipate	0.4	mg/l
Di (2-thylhexyl) phthalate	0.006	mg/l
Hexachlorobenzene	0.001	mg/l
Hexachlorocyclopentadiene	0.05	mg/l
2,3,7,8-TCDD (dioxin)	3X10 <sup>-8</sup>	mg/l

**TABLE 5**

**REGULATED VOLATILE AND OTHER ORGANIC CHEMICAL ANALYSIS**

<b>Contaminant</b>	<b>MCL</b>	<b>Units</b>
Benzene	0.005	mg/l
Carbon Tetrachloride	0.005	mg/l
o-Dichlorobenzene	0.6	mg/l
para-Dichlorobenzene	0.075	mg/l
1,2-Dichloroethane	0.005	mg/l
1,1-Dichloroethylene	0.007	mg/l
cis-1,2-Dichloroethylene	0.07	mg/l
trans-1,2-Dichloroethylene	0.1	mg/l
Dichloromethane	0.005	mg/l
1,2-Dichloropropane	0.005	mg/l
Ethylbenzene	0.7	mg/l
Monochlorobenzene	0.1	mg/l
Styrene	0.1	mg/l
Tetrachloroethylene (PCE)	0.005	mg/l
Toluene	1.0	mg/l
Total Trihalomethanes (TTHM) (Bromodichloromethane + Bromoform + Chloroform + Dibromochloromethane)	0.1	mg/l
1,1,1-Trichloroethane	0.2	mg/l
1,1,2-Trichloroethane	0.005	mg/l
Trichloroethylene (TCE)	0.005	mg/l
Vinyl Chloride	0.002	mg/l
1,2,4-Trichlorobenzene	0.07	mg/l
Xylenes (Total)	10.0	mg/l
Drinking Water Treatment Chemicals (Test for these only when polymers are used for water treatment.):		
Acrylamide	Treatment technique (0.005%, dosed @ 1 mg/l)	
Epichlorohydrin	Treatment technique (0.01%, dosed @ 20 mg/l)	

**TABLE 6**

**UNREGULATED VOLATILE ORGANIC CHEMICAL ANALYSIS**

**List 1:**

Monitoring Required  
For All Systems

Bromobenzene  
Bromodichloromethane (THM)  
Bromoform (THM)  
Bromomethane  
Chlorobenzene  
Dichlorodifluoromethane  
Chloroethane  
Chloroform (THM)  
Chloromethane  
o-Chlorotoluene  
p-Chlorotoluene  
Dibromochloromethane (THM)  
Dibromomethane  
m-Dichlorobenzene  
1,1-Dichloroethane  
1,1-Dichloropropene  
1,3-Dichloropropene  
2,2-Dichloropropane  
1,1,1,2-Tetrachloroethane  
1,1,2,2-Tetrachloroethane  
1,2,3-Trichloropropane

**List 2:**

Monitoring Required at  
**the State's Discretion**

Bromochloromethane  
n-Butylbenzene  
sec-Butylbenzene  
tert-Butylbenzene  
  
Fluorotrichloromethane  
Hexachlorobutadiene  
Isopropylbenzene  
p-Isopropyltoluene  
Naphthalene  
n-Propylbenzene  
1,2,3-Trichlorobenzene  
1,2,4-Trichlorobenzene  
1,3,5-Trimethylbenzene  
1,3-Dichloropropane

**TABLE 7  
RADIONUCLIDE ANALYSIS**

<b>Contaminant</b>	<b>MCL</b>
<u>Natural</u>	Units
Gross alpha particle activity (Includes Ra-226, but excludes radon and uranium)	15 pCi/l
Radium 226 + Radium 228	5 pCi/l
<u>Man made</u>	
Beta particle/photon activity	4 mrem/yr

**Table 8**  
**PUBLIC WATER SYSTEM SAMPLING PLAN FOR TOTAL COLIFORM RULE**  
 NATIONAL PARK SERVICE - US PUBLIC HEALTH SERVICE

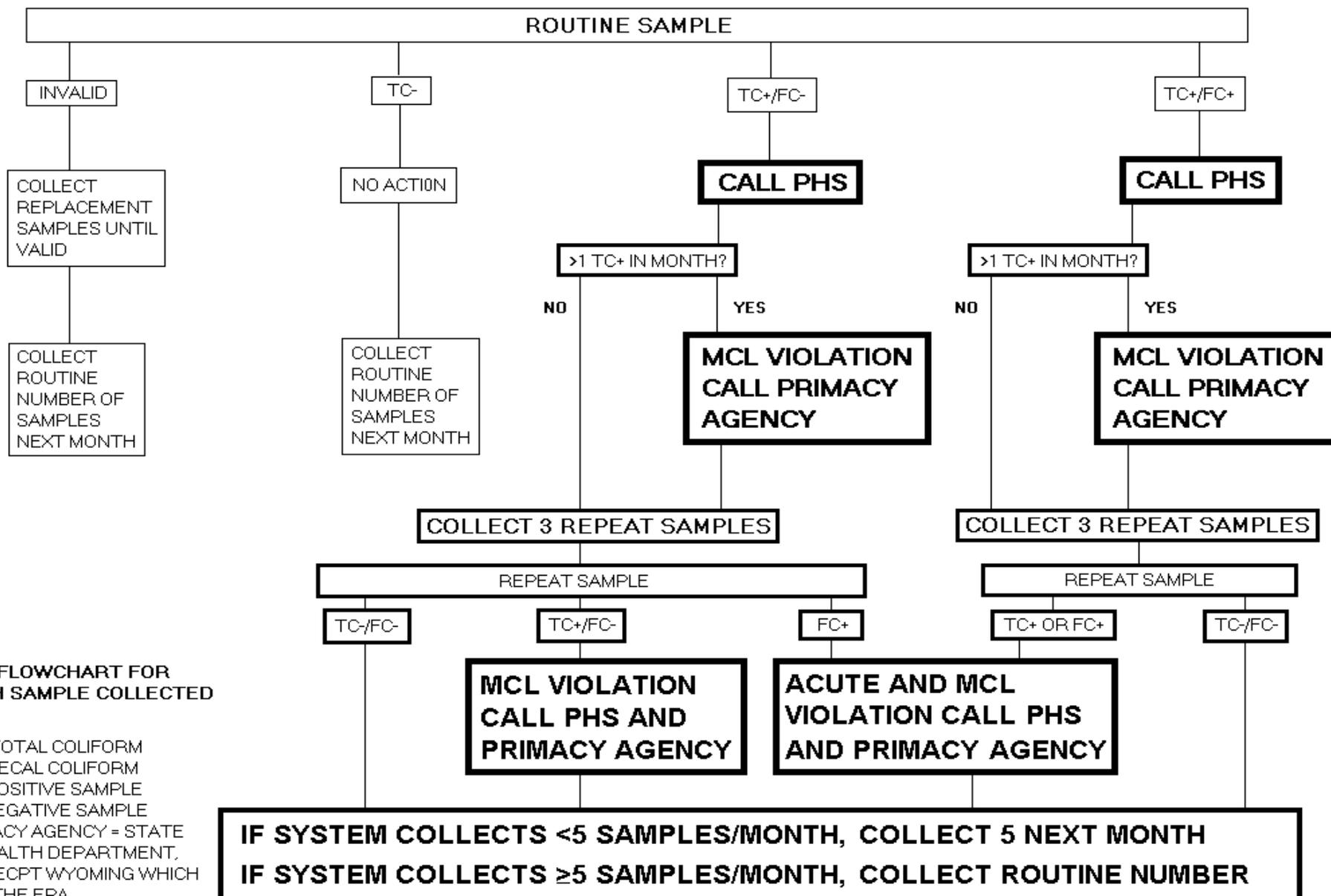




TABLE 10

NATIONAL PARK SERVICE WATER SYSTEMS  
ROUTINE MONITORING REQUIREMENTS

System		Bacteriological	Chlorine Residual	Turbidity	Chemicals						
					Primary Inorganic  Annual Nitrate For All	Secondary Inorganic & General Mineral	Organics		Radionuclide	Lead and Copper	
		Pesticide Herbicide	Volatile								
Public Community (PC) Public	GW	2/Month or See Page 22	1/Day	Population <500 1/Day	3 Years	3 Years	Annual unless State waiver issued	3 years unless State waiver issued	4 Years	<b>Initial</b> Sample all Water sources And Housing	
	SW		See Page 15		Annual	Annual					
Public Non-Community (PNC)	GW		1/Day	Population >500 Continuous or 4 Hour	9 Years	9 Years	1 Time	1 Time by 1994			1 Time
	SW		See Page 15					Not Required			
Non-Public (NP)	GW	1/Month	3/Week	Determine on Individual Basis	9 Years	9 Years	1 Time	Special Situations	Not Required	<b>Monitor</b> PC/PNT 6 Months Then Depends On Results	
	SW										